

# Chapter 16 - Interdisciplinary Graduate Programs

## Doctor of Philosophy Degree Program in Computational Analysis and Modeling (PhD)

### Administration

#### Coordinators

Richard J. Greechie, Program Chair  
Bala Ramachandran, Associate Dean for Research &  
Graduate Studies, Engineering and Science

#### Steering Committee Members

Ben Choi  
Weizhong Dai  
Raj Nassar

### Address

More information about the Computational Analysis &  
Modeling program can be obtained by writing  
Program Chair, CAM PhD program  
Louisiana Tech University  
P.O. Box 10348  
Ruston LA 71272  
(318) 257-3090

and/or visiting the web site:

<http://www.latech.edu/coes/cam/>

### Objective

The Ph.D. program in Computational Analysis and Modeling is an interdisciplinary doctoral degree program with participation from the College of Engineering and Science, the College of Administration and Business, and the College of Applied and Natural Sciences.

The program is intended to produce professionals who have a firm grasp of the fundamentals of mathematical modeling; who have the expertise to implement, analyze, and evaluate such models using state-of-the-art computing environments and advanced visual data analysis techniques; and who have made a cutting-edge contribution to some technical area associated with the program.

### Program Administration

The Program Chair and the steering committee, with the approval of the Dean of Graduate School, will establish the policies and procedures applicable to this program, evaluate applications, administer examinations, and oversee all aspects of the student's work.

### Admission Requirements

1. Applicants must meet the general requirements for admission to graduate programs at Louisiana Tech University (see Chapter 15 of this Catalog.)
2. A master's degree in one of the physical or biological sciences, engineering, computer science, or mathematics is recommended but not required. Exceptional students with a bachelor's degree in an appropriate area will be considered.
3. An official Graduate Record Examination (GRE) score is required. This requirement may be waived in the case of exceptional students.
4. Applicants must submit official transcripts.
5. Letters of recommendation may be required by the coordinator of the program.

### Core Requirements, Course Work and Dissertation

Typically, 72 hours of graduate work will be required for the degree. The Core consists of 15 graduate hours of mathematics, 9 graduate hours of computer science, and 9 graduate hours of a third area chosen from chemistry, physics, biology, forestry, finance, statistics, or an engineering discipline. The remaining courses will be determined by discussion between the student and the advisor, with the approval of the interim committee (see below).

The topic for the dissertation may be selected from the disciplines listed above for the third area, but may also include mathematics or computer science.

### Committees

An Interim Committee consisting of at least 4 members must be appointed for each student by the end of the first quarter in the program. This committee will consist of at least 1 member from the following areas:

1. Mathematics and Statistics
2. Computer Science
3. The third discipline selected.

A Doctoral Committee of 5 members will replace the student's interim committee within 1 year of passing the qualifying examination. The Doctoral Committee will work with the student to plan the research to be undertaken for the degree. It will be approved by the CAM steering committee and shall have the following membership:

1. The major professor (dissertation advisor)
2. At least one from mathematics and statistics
3. At least one from computer science,
4. At least one from the student's Area of Specialization.

### Examination Structure, Candidacy, and Time Limitation

#### Qualifying Examination

The qualifying examination will consist of written examinations in mathematics and in computer science and an appropriate exam in the area of application. The qualifying exam in the area of application may consist of the master's degree in that area. Special permission from the Dean of the Graduate School is required to take any one of these exams more than twice.

#### Comprehensive Examination

Within 1 year of passing the qualifying exam, a student is normally expected to pass a comprehensive examination in his/her area of specialization. The comprehensive exam will include a lecture followed by a question/answer period on the student's proposed dissertation topic that exhibits a clear demonstration of an understanding of the principles and methods involved in his/her proposed area of specialization.

#### Candidacy

After the student has successfully passed the comprehensive examination, the student will be admitted to candidacy.

#### Dissertation Defense Examination

The student's Doctoral Committee administers the dissertation defense exam. It will, in most cases, consist of an open public defense of the results of the dissertation. This final exam must

be successfully completed in accordance with the deadlines published by the Graduate School. Those serving on the doctoral committee must recommend, with at most one dissent, that the student has satisfactorily passed the dissertation defense exam.

## Timetable

**Matriculation** - Interim Committee must be appointed and an initial plan of study submitted by the end of a student's first quarter of study.

**Dissertation Research Proposal** - A proposal outlining the research to be undertaken for the dissertation must be submitted by the end of the fourth quarter of enrollment, not including summers.

**Qualifying Exam** - To be taken in the first Fall Quarter following 3 quarters in the program, consisting of written examinations in mathematics and computer science, and appropriate examination in the third discipline (may consist of master's degree).

**Doctoral Committee** - Chosen within 1 year of passing the qualifying examination, with the membership as stipulated above.

**Comprehensive Exam** - (In the area of specialization, the area in which the dissertation is written) Within 1 year of passing the qualifying exam.

**Admitted to Candidacy** - Upon passing the comprehensive exam, the student is admitted to candidacy for the doctoral degree.

Please note the maximum time limitations for completing a doctoral degree stated in Chapter 15 of this catalog.

## Master of Science Degree Program in Molecular Sciences and Nanotechnology (MSMSNT)

### Administration

#### Coordinators

Bala Ramachandran, Associate Dean for Research & Graduate Studies, Engineering and Science  
William J. Campbell, Associate Dean for Graduate Studies & Research, Applied and Natural Sciences

#### Steering Committee Members

Engineering and Science: Yuri Lvov  
Applied and Natural Sciences: David K. Mills

### Address

More information about the Molecular Sciences and Nanotechnology program can be obtained by writing to one of the coordinators:

c/o Dean of Graduate School  
Louisiana Tech University  
P.O. Box 7923  
Ruston LA 71272  
(318) 257-2924

and/or visiting the web site:

<http://www.latech.edu/coes/grad-programs/>

### Objectives

The objectives of this interdisciplinary program are

1. To train graduate students in experimental, theoretical, and computational aspects of research in molecular biology, chemistry, and physics, particularly where these disciplines intersect.

2. To enhance interdisciplinary applied research at Louisiana Tech University in micro and nanotechnology, including molecular biology and protein engineering.
3. To prepare graduate students for the next generation of careers in science and technology by offering a unique, flexible, and highly marketable graduate degree.
4. To prepare graduate students for interdisciplinary or traditional PhD programs in biochemistry, chemistry, materials science, molecular biology, and physics which emphasize research at the intersections of one or more of the traditional disciplines.

### Program Administration

The coordinators and the steering committee, with the approval of the Dean of Graduate School, will establish the policies and procedures applicable to this program, evaluate applications, administer examinations, and oversee all aspects of the student's work.

### Admission Requirements

1. An undergraduate degree in biological sciences, biomedical engineering, chemical engineering, chemistry, electrical engineering, or physics, or a closely related discipline such as biochemistry, biophysics, chemical technology, engineering physics, molecular biology, or pharmacology.
2. A Graduate Record Examination (GRE) V+Q score of 1050 for students who do not have an undergraduate degree from an accredited US institution. Outstanding academic performance at the undergraduate level could offset this minimum requirement to some extent.
3. International students are required to submit a TOEFL score of at least 213 (computer-based). TOEFL scores older than 2 years will not be accepted by the Graduate School.
4. For students with an undergraduate degree from an accredited US institution, the following formula will be used to determine admission eligibility:  $GPA \times 200 + GRE V+Q = 1400$  for unconditional admission, 1200 for conditional admission.

### Course Requirements

Thesis or practicum options are available. The thesis option consists of 24 semester credit hours (SCH) of courses + 6 SCH of research and thesis for a total of 30 SCH. The Practicum Option consists of 33 SCH of courses + 3 SCH of practicum for a total of 36 SCH.

All students will be required to take either MSNT 505 (Nanotechnology Principles) or MSNT 521 (Principles of Cell and Molecular Biology) depending on research interests. All students will also take MSNT 502 (Research Methods) and MSNT 504 (Seminar) as core courses. The remainder of the curriculum is to be determined by consultation with the research advisor and advisory committee.

Some remedial work may be necessary to acquire the required background if the student decides to change fields at this point (e.g., physics students may have to take biology classes and biology students may need to improve their knowledge of the physical sciences).

### Committee, Plan of Study, and Research Proposal

A graduate advisory committee will be appointed for each student by the end of the first quarter of enrollment. The advisory committee shall consist of at least 3 members, with at least 1 member from the two participating colleges (Engineering

& Science, and Applied & Natural Sciences). A Plan of Study listing the courses to be taken should be prepared in consultation with the research advisor, approved by the committee, and submitted by the end of the first quarter of enrollment. The choice between thesis and non-thesis options must be made at this time.

A research proposal detailing the research to be conducted for the thesis or practicum must be prepared in consultation with the advisor, approved by the advisory committee, and submitted by the end of the second quarter of enrollment.